

# PROCEEDINGS

OF

## THE ROYAL SOCIETY.

*December 1, 1873.*

### ANNIVERSARY MEETING.

Sir GEORGE BIDDELL AIRY, K.C.B., President, in the Chair.

Mr. Merrifield, for the Auditors of the Treasurer's Accounts on the part of the Society, reported that the total receipts during the past year, including a balance of £447 16s. 10*d.* carried from the preceding year, amount to £4914 19s. 5*d.*; and that the total expenditure in the same period amounts to £4221 6s., leaving a balance at the Bankers of £690 13s. 11*d.*, and £2 19s. 6*d.* in the hands of the Treasurer.

The thanks of the Society were voted to the Treasurer and Auditors.

The Secretary read the following Lists :—

Fellows deceased since the last Anniversary.

#### *On the Home List.*

Thomas Baring.  
Richard Beanish.  
John Bishop, F.R.C.S.  
Lord Chief Justice Sir William Bovill.  
Thomas Shaw Brandreth.  
Charles Purton Cooper, LL.D.  
Frederic Crace-Calvert, Ph.D.  
Baldwin Francis Duppa, F.C.S.  
John Edye, C.B.  
Rev. George Fisher, M.A.  
Charles Philip Yorke, Earl of Hardwicke, Vice-Admiral, D.C.L.  
Sir Henry Holland, Bart., M.D., D.C.L.  
Henry Bence Jones, M.D., D.C.L.  
Robert MacAndrew, F.L.S.

John Robinson McClean, M.I.C.E.  
Sir Frederick Madden, K.H.  
Edward Latham Ormerod, M.D.  
George Ormerod, D.C.L.  
Prof. Richard Partridge.  
William John Macquorn Rankine, LL.D.  
Sir Francis Ronalds, Knt.  
Rev. Canon Adam Sedgwick, M.A.  
Archibald Smith, LL.D.  
John Spencer Stanhope.  
Paul Edmund Count de Strzelecki, C.B.  
Sir William Tite, C.B.  
Samuel Wilberforce, Lord Bishop of Winchester.

*On the Foreign List.*

Auguste De la Rive.  
 Christopher Hansteen.  
 Baron Justus von Liebig.  
 Hugo von Mohl.

Gustav Rose.  
 Philippe Edouard Pouletier de  
 Verneuil.

*Change of Name and Title.*

Sir Robert Alexander Shafte Adair to Lord Waveney.  
 The Hon. John William Strutt to Lord Rayleigh.

## Fellows elected since the last Anniversary.

The Right Hon. Hugh Culling  
 Eardley Childers.  
 William Aitken, M.D.  
 Sir Alexander Armstrong, M.D.,  
 K.C.B.  
 Robert Stawell Ball, LL.D.  
 John Beddoe, M.D.  
 Frederick Joseph Bramwell, C.E.  
 Captain Edward Killwick Calver,  
 R.N.  
 Robert Lewis John Ellery, F.R.A.S.

Lieut.-Col. J. Augustus Grant,  
 C.B., C.S.I.  
 Clements Robert Markham, C.B.  
 George Edward Paget, M.D.  
 George West Royston-Pigott, M.D.  
 Osbert Salvin, M.A.  
 The Hon. John William Strutt,  
 M.A.  
 Henry Woodward, F.G.S.  
 James Young, F.C.S.

*On the Foreign List.*

Baron Jean Baptiste Julien  
 D'Omalius d'Halloy.  
 Georg Adolph Erman.  
 Asa Gray.

Franz Gustav Jakob Henle.  
 Charles Hermite.  
 Otto Wilhelm Struve.

The President then addressed the Society as follows :—

GENTLEMEN,

WE meet, at length, in Apartments to the occupation of which we have long looked forward, and in which we hope to find scientific, literary, and social accommodation superior to that which we have hitherto enjoyed. And I trust that we may consider ourselves established here with a degree of permanency at least comparable to those which the Society experienced in Crane Court and in Somerset House. In congratulating the Society on this important step of localization, I would express my hope that our continued westerly movement will not be misinterpreted. Much of the practical vigour of the Society has always depended on the action of Fellows engaged in the transactions of busy life; and our movement from Somerset House, and in a certain degree from the regions frequented or inhabited by those able men, will I trust be ascribed to its proper cause—the difficulty of finding a suitable place in

those parts of this great city in which commerce or manufacture is most active, or in which the demands of the State are most imperative.

Our Foreign Secretary, Professor W. H. Miller, has intimated to the Council his wish to withdraw from the duties and the labours of the office which he has held for many years with advantage to the Society, and for which he is eminently adapted. In offering to Professor Miller your thanks for his long-continued services, I have to add my confidence that the office will be well sustained by the gentleman whom the Council submit for your election.

It has not been usual for your Presidents to allude by name to those of your Ordinary Members whose decease the Society has had to lament during the year last elapsed. But I hope that an intimate friendship of more than fifty years will justify me, in your opinion, in alluding to one, the only Copley Medallist in our British List lost in the last year, the late Professor Sedgwick. I cannot sufficiently express my veneration for the unselfishness, the love of truth, the kindness of heart, which distinguished that extraordinary man; and I cannot conceal the expression of my admiration of his general ability, and my strong confidence in the soundness of his judgment on controverted points which might come before him. After this notice, I am bound to allude briefly to others whose names will appear in our official Obituary. Confining my remarks to those who have furnished papers to our 'Transactions,' there are:—the Rev. G. Fisher, first known by magnetic observations in an Arctic Expedition, and afterwards by his instructions to our Naval Service; Sir Henry Holland, the senior Fellow of the Society, equally distinguished by his reputation in the Medical profession, by his fame as a traveller, by his literary records of political and personal life, and by the mixture of science and sociality which endeared him to all who knew him. Dr. H. Bence Jones will be remembered for his labours in reference to urinary chemistry,—W. J. M. Rankine for his mathematical labours in problems of engineering and in the motions of fluids,—Sir F. Ronalds for his knowledge of electricity, his introduction (collaterally with others) of photographic self-registration, and his attempts at establishing a telegraph not by galvanism but by electricity,—and A. Smith, a Royal Medallist, for his general mathematical acumen, and for the application of it to the theory of the induced magnetism of iron ships.

But nothing prevents me from alluding to the losses among our Foreign Members. The Baron Liebig, a Copley Medallist, was the founder of a branch of chemical science, not entirely new, but carried out by him to an extent and perfection that have given it importance which we could hardly have expected it to attain. Professor Hansteen personally observed terrestrial magnetism over a great extent of country, and was I believe the first person in modern times who endeavoured to combine all the magnetical observations in different parts of the earth then available, his own attempt to explain them being founded on an

assumption as to the action of two great magnets. On the merits of Von Mohl, Rose, and Pouilletier de Verneuil information will be given by Officers of the Society, who can speak with greater accuracy than I could assume for my own statements.

The Council of the Society, and its various Committees (for disposal of the Government Grant, for the Library, for management of the Donation Fund, and of that appropriated to Scientific Relief), have been working with their usual activity. The principal grant recommended by the Government-Grant Committee, and sanctioned by the Council, was for the construction of a Siderostat, an instrument frequently desired, but of which the expense is too great to be borne by an individual. It is believed, however, that the cost may now be materially reduced.

In my Report of last year I alluded to the Catalogue of Scientific Papers, completed to 1863, and in progress to 1873; perhaps the following singular instance of its value may be interesting to the Society. In settling an international boundary, some years ago, reference was made to certain astronomical determinations. The Government of the present day, on taking steps for ascertaining the boundary so defined, were unable to discover the official report of the astronomical observations. On the application of the Government to me, I carefully examined the papers of the Royal Observatory and those of the Board of Longitude; but the Report was not found. I then requested our Assistant Secretary, Mr. White, to examine the papers of the Royal Society; he was equally unsuccessful. It occurred, however, to Mr. White to refer to the Catalogue of Scientific Papers for the published works of the astronomer who was known to have conducted the observations in question; and there he discovered the desired Report, published under circumstances of solemn authenticity in a foreign periodical. It is not improbable that the pecuniary value of this discovery may have many times exceeded the whole expense of forming the Catalogue.

The Council have not been engaged during the past year in any correspondence with our own Government or with Foreign Bodies; they have, however, at the request of the President and Council of the Royal Geographical Society, appointed a Committee to confer with a Committee of that Society, on the best methods of utilizing for Physical Science any future Arctic Expedition. But the Council have not taken any step in urging the proposal of such an Expedition on the attention of Her Majesty's Government.

The Official Scientific Commission, of which your Home Secretaries and other Fellows of the Society are Members, have issued an important Report on the means of making our great Universities more available for the conduct of scientific investigation. Other proposals have been published, by independent Fellows of the Society, for universal instruction leading to physical investigation, and for the establishment of physical laboratories.

In speaking of the scientific subjects which have occupied the Ordinary Meetings of the Society, or which have been intended for publication in its 'Transactions' or its 'Proceedings,' I may perhaps notice individually the following :—

In Astronomy, we have communications from Messrs. Lockyer, Seabroke, and Huggins, on viewing the solar chromosphere and prominences. And we have the elaborate paper of the Earl of Rosse on the heat radiated from the Moon, with all the modifications depending on the lunar phases and on the absorption produced by our atmosphere at different elevations of the moon.

In Oceanic Science, Mr. Wells has communicated observations on the temperature of the sea between Greenland and Spitzbergen, establishing the unexpected fact that the water on the Spitzbergen coast is considerably warmer than that on the Greenland coast; and Commander Wharton has ascertained with certainty that the outwards current of the superficial waters from the Black Sea through the Bosphorus and the Dardanelles is accompanied by an inwards current of the deeper waters.

In Biology, we have experiments and remarks by Dr. Bastian and Messrs. Ray and Lankester on the development of life in organic infusions, bearing partly on the disputed subject of spontaneous generation; and we have also a paper by Dr. Ward Richardson "On Muscular Irritability after Systemic Death," with other medical and physiological discussions.

In Palæontology, Professor W. C. Williamson has continued his examinations of the structure of fossil plants in the Coal-measures; and Professor Owen has extended his description of the Fossil Mammals of Australia to those which may properly be referred to the same family as the Kangaroos.

In Botany, the more complex forms of leaf-arrangement around the parent stalk have been referred to the primary form of leaves arranged in two opposite ranks, by mechanical considerations of a simple character.

In Chemistry we have numerous analyses and experiments, but, I believe, no establishment of new general principles.

In Optics, Messrs. Stearn and Lee have described the effects of pressure on gases, in altering the character of their spectra.

In Magnetism I believe that the only memoir is one describing the internal magnetic influence of the largest iron tubes in existence, namely the great tubular bridges of Bangor and Conway.

In Mechanics there is much information by Sir W. Fairbairn on the durability of iron ships, and on the strength of riveted joints; and, in combination of meteorological facts with mechanical invention, Mr. F. Galton has planned a machine for indicating the best course for a ship.

I scarcely need to remark that a limited list of communications, like that which time permits me now to offer, must be very incomplete.

The present appears, however, to be a proper opportunity for inviting the attention of the Society to the progress of Sciences, of the same class as those which it specially adopts for the subject of its own labours, in the external world.

Commencing with Astronomy.—It is very gratifying to Gravitational Astronomers to learn that M. Le Verrier has communicated to the French Académie des Sciences (I believe *in extenso*) his theories of Jupiter and Saturn.—In Cometary Astronomy, the most striking fact is the unexpected meteor-shower which occurred on November 27th, 1872. Professor Klinkerfues telegraphed the report of this shower and its apparent course to Mr. Pogson at Madras; and Mr. Pogson, directing his telescope in that line, discovered a comet receding from the earth, and (apparently beyond doubt) the representative of the meteor-shower. The course of this comet is so near to that of the lost Biela's comet as to make it probable that it is really the same.—Dr. Huggins some time since found, from spectroscopic observations, traces of carbon in the composition of comets; this has been verified by Herr Vogel and Mr. Plummer in observations of comets in the present year.—Dr. Huggins has employed the telescope supplied by this Society in scrutinizing seven nebulae for discovery of motion or change, and in observations of their spectra, with the view of ascertaining their apparent motion to or from our system; and facility has been given to this research by the proximity of a spectral line of the nebulae to a line in the lead-spectrum: the results have not indicated any discoverable motion.—Father Secchi has remarked the sudden appearance of a brilliant point in the sun, which gave reversion of spectral lines, indicating ignition, with such a distortion of a line as appears to show that the igneous matter approached us; that is, that there was explosion.—On the constitution of the sun there has been much controversy.—The Transit of Venus December 8th, 1874, has engaged much attention. The Russian Government is preparing to equip twenty-seven stations, all on land. The American Government proposes to establish three stations in the north and four or five in the south. The British original scheme of five stations has been extended, contingently, to eight:—two being regarded as subordinate to Honolulu, for strengthening that important station; and one, at Heard Island (if information expected from the 'Challenger' shall report it practicable), or at a second point of Kerguelen's Island, for strengthening that of Christmas Harbour. The French Government has proposed to establish five stations, and the German Government four. Some of our colonies and colonial observatories are taking up the matter with interest. It is understood that Lord Lindsay is preparing a well-equipped private expedition to the Mauritius. For ocular observation, the largest telescopes are about 6 inches aperture; with some of these, double-image measures of cusps, &c. are proposed, either by heliometer, or by an eyepiece arranged by me many years ago. For photo-

graphic records, some will employ Mr. De La Rue's photoheliograph; some will endeavour to arm it with M. Janssen's arrangement for taking numerous pictures of Venus at small intervals; some prefer a horizontal telescope 40 feet in length, into which the sun's rays will be thrown by a large plane mirror moved by a heliostat, and by which the primary image of the sun will be photographed. A working model of the Transit has been established at the Royal Observatory, by means of which the singular optical phenomena are well seen. My own estimate, and that of my experienced friends, on the amount of uncertainty, reduces it low; but I believe that my younger observers are not so successful.—German astronomers have proposed to make use of observations of the Minor Planets (Flora in the present year) for measuring the Solar Parallax; but I conceive that Mars in 1877 will be very far superior.—The publication of the Eclipses of 1870 and 1871 is still delayed, mainly by troubles with engravers.—I am happy to state that, at the instance of the Smithsonian Institution, and by the liberality of the Anglo-American Company (who have declined all commercial remuneration), telegraphic announcements of astronomical discoveries are now made direct from the United States to Europe, and *vice versa*.

In Geodesy and related subjects an important repetition of Cavendish's experiment has been made by MM. Cornu and Baille, using, for the attracting material, hollow spheres filled with mercury, which was transferred from one sphere to the other; the mean density of the earth thus obtained is 5.56.—It is proposed in France to repeat the observations for the great arc of meridian.—Allusion was made in the last two Addresses to the interruption of the Indian pendulum-observations by the death of Captain Basevi; the pendulums (two the property of this Society, and two belonging to the Russian Government) have been brought to this country; and observations of them have been made at Kew Observatory by Captain Heaviside. It is proposed, I believe, to combine with these observations a re-observation of Kater's double-knife-edge pendulum.

Geographical research has been very active.—The 'Challenger,' after three times crossing the Atlantic, was last reported at Bahia. One result of her operations is the establishment of a general uniformity of depth, averaging perhaps 2300 fathoms. A second is, the ascertaining of the temperature at different depths; in some places in low latitudes the deep-sea temperature is lower than in high latitudes. A third is, the dredging up of Crustacea of new forms. A fourth is, the ascertaining the character of the soft bottom of the Atlantic: this will probably require the examination of the geologist.—Dredgings made among the banks of the New-England coast by Mr. Verrill have given results very similar to those of Dr. Carpenter.—The Congo expedition, fitted out, I believe, by Mr. Young, and organized by the Royal Geographical Society, was last heard of at some distance up the country, at a point on the

river which was gained, not by passage from its mouth, but by crossing from another landing-place.—Of the precise discoveries by Sir Samuel Baker, and the last year's movements of Dr. Livingstone, little seems to be known.—Political circumstances have stimulated much research in Central Asia.—But the interest of all these sinks before that of the Arctic explorers. In the instance of the American ship 'Polaris,' nineteen men, women, and children, fortunately furnished with provisions, lived upon an icefloe (hopelessly separated from the ship in latitude  $80^{\circ} 2'$ ) through the darkness of Arctic winter, drifting down Smith's Sound and Baffin's Bay, from October 15, 1872, to April 1, 1873, then betook themselves to a boat, and were rescued by the 'Tigress' on April 30, in sight of the coast of Labrador. Subsequently, eleven of the crew who had been left in the ship, then beset in the ice, built boats for themselves, and were picked up by the whaler 'Ravenscraig,' were transferred to the 'Arctic,' and were safely carried home. Some additions were made to our knowledge of the regions north of Smith's Sound.—And another Swedish expedition, in the Polheen and Gladan, under the direction of Professor Nordenskiöld, fast locked in a bay near the northern extremity of Spitzbergen, was rescued by the 'Diana.' I must avow that the fortunate termination of these two enterprises does not in any degree blind me to the dangers of Arctic exploration in general.

In Geology, while the usual activity has been shown in collecting details, and the usual accuracy in discussing them, I am not aware of the introduction of any new principle, except in the theory proposed by Professor Dana, explaining the elevation of mountain-ground and continents generally by the forced contraction which must have taken place in the crust of the earth in consequence of the cooling of the interior.

In the maritime part of the publications of the Meteorological Office, an addition to the ten-degree square mentioned last year, applying to the regions adjacent to that square, is now in the press. Sir James Ross's observations south of the latitude  $60^{\circ}$  S., made in the expedition 1840–1843, have been published in an orderly form. As regards local meteorology, a new and valuable station has been established at Stor-noway; the daily results of all stations are communicated, and proper warnings given, to 129 places on the British coasts, and (at the request of the French Government) to various ports from Dunkirk to Nantes. In 1872, eighty per cent. of these warnings were successful. The daily charts (first introduced by M. Le Verrier, but now issued on a highly extended plan by the Meteorological Office) are circulated among a large list of subscribers. I think that comparison of the records of the various atmospheric elements upon these charts, continued from day to day, would be more likely than any thing yet published to throw light upon the difficult question of causes and effects in Meteorology.—Dr. Daniel Draper has traced the courses of rectilinear waves of cold and of storm



across the United States. He has also shown that wind-storms are propagated from the shores of the United States to the shores of Britain ; and in eighty-six predictions of storms to occur on the British coasts, only three were failures.—At the Royal Observatory, Greenwich, a laborious discussion of the photographic meteorological records 1848–1868 is now far advanced.

In Anatomy, the most striking subject appears to be Professor Ferrier's experimental discussion of the actions of different parts of the brain, explained at the late Meeting of the British Association.

In Natural History, much has been added to our knowledge of birds by the works of Buller on New Zealand, Viscount Walden on Celebes, and the termination of Gould's labours on Great Britain.—Murie, Owen, and Newton have done much on special points in Comparative Anatomy.—It seems probable that considerable knowledge of the habits of fishes may be gained from the large Aquaria lately established.

Palæontology has made considerable advances. The most important publications are the following:—With the assistance of the Imperial Academy of St. Petersburg, Professor Von Brandt has given the results of a long series of researches on the fossil Cetacea of Europe, a work almost forming a supplement to Cuvier's '*Ossements Fossiles*.' Aided by the Public Museum of Buenos Ayres, Dr. Burmeister has almost completely restored the extinct species originally indicated by the names *Toxodon*, *Glyptodon*, *Macrauchenia*. Professor Owen, in the '*Zoological Transactions*,' has continued his restoration of the extinct Birds of New Zealand, and appears to have discovered evidence of the former existence of a wingless bird of great size. The principal advances in fossil Botany are those by Professor Williamson, already mentioned.

Medicine, in its practical character and on the broad scale, has raised, but has not always solved, questions of great importance. We are not yet able to assert that contagious diseases can or cannot commence without antecedent contagion ; but the organization for tracing the course of contagion is much improved, and may enable us ultimately to answer this question.—The subject of "Nerve Storms" has been well discussed.—The use of self-recording instruments, and the application of the thermometer, have given information which has led to improved treatment : the spectroscope promises to be useful in medical jurisprudence.—Surgery, as I understand, has been made milder than formerly ; morbid fluids are more easily extracted ; large ulcers are healed by placing healthy skin upon them ; medicines are sometimes injected into the skin ; and there is general activity in the examination of surgical methods.

The advances of scientific Botany have been principally in the following directions :—Dr. Hooker and Mr. Bentham continue their Catalogue of the Genera of all known flowering plants ; Mr. Bentham has also advanced with his publication on the Australian Flora. Discussions have arisen on the question whether Lichens are or are not parasites of a

simpler form of Algæ. Much attention has been given to the *Bacteria*, and to their supposed agency in producing putrefaction. The mode of reproduction of Fungi has been a subject of examination and speculation. The curious fact appears to be ascertained that movement of the leaf of the *Dionœa muscipula* produces electrical phenomena analogous to those in the movement of muscle.

In Chemistry, though a great number of analyses &c. have been made, I do not learn that any step of system or fundamental science has been taken, except in the doubts expressed whether the existence of four isomeric lactic acids, apparently demonstrated by Wislicensis, can be made consistent with the present theory of organic chemistry.

In the science of Optics a new determination of the velocity of light has been made by M. Cornu, using the method of transmission of a ray of light first directly, and then by reflection, between the teeth of a rotating wheel. The velocity thus found *in vacuo* is 298,500 kilometres per second of mean solar time.—M. Quinke, in experiments on diffraction, has shown that there is frequently an unexpected accompaniment of polarization.

The practical science of Galvanic Telegraphy undergoes continual improvement, especially in the power of transmitting numerous words in a short time, and in the arrangement of sympathetic clocks.—But the point to which I would more particularly call attention is, that the practicability of duplex telegraphy by simultaneous currents in opposite directions appears to be established, at least in many circumstances. If they are accurately simultaneous, the conclusion (previously entertained by theorists) appears to be inevitable that the so-called currents are waves.

M. D'Abbadie's Magnetic Survey of Abyssinia and Brazil, made several years past, has lately been published.

I have now to announce the award of the Medals.

The Copley Medal has been awarded by the Council to Professor Hermann Ludwig Ferdinand Helmholtz, M.D., For. Memb. R.S. It would be difficult for me, within the limits of this Address, to state the number and the importance of the claims of Professor Helmholtz to our recognition. His published books on the Conservation of Energy and the Theory of Music, and his 'Handbook on Physiological Optics,' have assisted greatly in the progress of their respective sciences. His memoirs have ranged through nervous physiology, hydrodynamical theory, instruments (as the ophthalmometer and the ophthalmoscope) for exact measurement and for medical examination of the eye, and other important subjects, and have been generally recognized as giving real additions to our knowledge.

PROFESSOR MILLER,

As representing the Council of the Royal Society, I request that you

will place this our most honourable Medal in the hands of Professor Helmholtz, and assure him that we appreciate very highly the services which he has rendered to various branches of science.

A Royal Medal has been awarded to Professor Allman, F.R.S., for his numerous zoological investigations, and more especially for his work upon the Tubularian Hydroids. The subject of these labours is one upon which few persons are qualified to enter; and the Council are impressed with the delicacy of the work and the value of the scientific results.

PROFESSOR ALLMAN,

In the name of the Council of the Royal Society, I present you with this Medal, in token of their appreciation of your valuable services to Zoology.

A Royal Medal has been awarded to Professor Henry Enfield Roscoe, F.R.S., for his various Chemical Researches, more especially for his investigations of the Chemical Action of Light, and of the Combinations of Vanadium.

PROFESSOR ROSCOE,

I have much pleasure, as the organ of the Council of the Royal Society, in presenting you with this Medal, in testimony of the value which the Council attach to your various Chemical researches.

And now, gentlemen, I have to make an announcement which I could wish I had been able to defer for some years. I must ask you to accept my resignation of the office of President. I do this with great regret, for more than one reason. I scarcely need to say that I received with great pride your honourable call to that office, and that I should have valued even more highly a series of repetitions of the expression of your confidence. It is matter of much grief to me, personally, that I feel myself compelled to abandon this gratification; but I am more grieved because I feel that the Presidential office has not been properly sustained, and that a continuance of tenure by me might permanently endanger its efficiency. The primary causes of this failure are:—the severity of official duties, which seem to increase, while vigour to discharge them does not increase; and the distance of my residence. It has resulted from these causes that I have been unable to attend Council and Committee Meetings and Meetings of the Society, and Trust Meetings connected with the Presidency, so fully as I could have wished—that I have been unable to establish that personal acquaintance with my colleagues which I hold to be almost essential for the good conduct of a Society—and that I could not hope to carry out any measure beyond the merest routine. The difficulties which

I have mentioned might have been met in some degree by properly arranged expenditure, if such had been legitimately in my power; but another cause now comes on which I fear cannot be met, a difficulty of hearing, which unfits me for effective action as Chairman of Council.

I respect the sentiment which has prompted the Society to seek for its President a man of supposed scientific character, and, perhaps in preference, a man in official scientific position; and I join in the unanimous feeling of the Council that, this principle being admitted, its application could never have been better made than in the selection of the Fellow whom they recommend to you as successor to myself. But I still think that, practically viewed, the principle is not the best that can be adopted—and that considerations on the leisure which the President can devote to the concerns of the Society, on the proximity which enables him at any moment to enter into its business, and on the personal vigour which he may be expected to bring into all his transactions with it, ought to hold a very important place.

But, in retiring from the Presidency, and practically from the Council, I do not, gentlemen, retire from the Society. There are other positions in which I may hope to render service. I have frequently been requested by the Council to report upon the character of papers communicated to them; and in this capacity my power of meeting the wishes of the governing body is undiminished. Perhaps other occasions will arise in which I can continue to prove my devotion to the interests of the Society.

On the motion of Sir Thomas Watson, seconded by Mr. J. M. Arnott, it was resolved,—“That the thanks of the Society be returned to the President for his Address, and that he be requested to allow it to be printed.”

The Statutes relating to the election of the Council and Officers having been read, and Mr. David Forbes and Mr. Savory having been, with the consent of the Society, nominated Scrutators, the votes of the Fellows present were collected, and the following were declared duly elected as Council and Officers for the ensuing year:—

*President.*—Joseph Dalton Hooker, C.B., M.D., D.C.L., LL.D.

*Treasurer.*—William Spottiswoode, M.A., LL.D.

*Secretaries.*— { Prof. George Gabriel Stokes, M.A., D.C.L., LL.D.  
 { Prof. Thomas Henry Huxley, LL.D.

*Foreign Secretary.*—Prof. Alexander William Williamson, Ph.D.

*Other Members of the Council.*—Sir George Biddell Airy, K.C.B., M.A.; Sir B. C. Brodie, Bart., M.A., D.C.L.; Professor Arthur Cayley, LL.D.; John Evans, Sec. G.S., F.S.A.; Daniel Hanbury, Treas. L.S.; Nevil Story Maskelyne, M.A.; Prof. James Clerk Maxwell, M.A.; C. Watkins Merrifield, Hon. Sec. I.N.A.; Joseph Prestwich, V.P.G.S.; Andrew

Crombie Ramsay, LL.D.; Rear-Admiral G. H. Richards, C.B.; Prof. George Rolleston, M.D., M.A.; Prof. J. S. Burdon Sanderson, M.D.; William Sharpey, M.D., LL.D.; Francis Sibson, M.D.; Major-Gen. R. Strachey, R.E., C.S.I.

The thanks of the Society were given to the Scrutators.

The following Table shows the progress and present state of the Society with respect to the number of Fellows:—

	Patron and Royal.	Foreign.	Com- pounders.	£4 yearly.	Total.
November 30, 1872.	4	48	278	257	587
Since elected . . . . .			+ 4	+ 12	+ 16
Since deceased . . . .		— 5	— 16	— 11	— 32
December 1, 1873.	4	43	266	258	571

*Receipts and Payments of the Royal Society from December 1, 1872, to November 30, 1873.*

	£	s.	d.		£	s.	d.
Balance at Bank and on hand .....	447	16	10	Salaries, Wages, and Pension .....	1055	19	0
Annual Contributions, Admission Fees, and Compositions .....	1412	0	0	The Scientific Catalogue .....	227	10	6
Rents .....	263	5	6	Books for the Library and Binding .....	108	13	2
Dividends .....	1518	1	8	Printing Transactions and Proceedings, Paper, Binding, Engraving, and Lithography .....	1474	10	8
Ditto, Trust Funds .....	311	16	5	General Expenses (as per Table subjoined) .....	1064	17	0
Sale of Transactions, Proceedings, &c. ....	406	19	7	Society Expenses .....	50	0	0
E. H. Stirling, Donation .....	100	0	0	Donation Fund .....	50	0	0
Sale of Miscellaneous Library Books .....	370	10	0	Rumford Fund .....	136	8	0
Sale of Fittings and Waste, and overpayment .....	84	9	5	Wintringham Fund .....	35	5	0
				Copley Medal Fund .....	4	14	5
				The Earl of Rosse, Bakerian Lecture .....	4	0	0
				Rev. T. S. Evans, Fairchild Lecture .....	2	18	9
				Dr. Richardson, Croonian Lecture .....	2	19	0
				Additional on Rumford, Copley, and Fairchild .....	3	10	6
				Balance at Bank .....	4221	6	0
				Balance on hand .....	690	13	11
					2	19	6
					<u>£4914</u>	<u>19</u>	<u>5</u>

W. SPOTTISWOODE,  
*Treasurer.*

*Estates and Property of the Royal Society, including Trust Funds.*

- Estate at Mablethorpe, Lincolnshire (55 A. 2 R. 2 P.), £136 per annum.  
 Estate at Acton, Middlesex (34 A. 2 R. 9½ P.), £170 per annum.  
 Fee Farm near Lewes, Sussex, rent £19 4s. per annum.  
 One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, £3 per annum.  
 £14,000 Reduced 3 per Cent. Annuities.  
 £29,569 5s. 8d. Consolidated Bank Annuities.  
 £403 9s. 8d. New 2½ per Cent. Stock—Bakerian and Copley Medal Fund.  
 £660 Madras Guaranteed 5 per Cent. Railway Stock—Davy Medal Fund.  
 £10,000 Italian Irrigation Bonds—The Gassiot Trust.

*Statement of Income and Expenditure (apart from Trust Funds) during the Year ending November 30, 1873.*

	£	s.	d.
Annual Contributions .....	1052	0	0
Admission Fees .....	160	0	0
Compositions .....	200	0	0
Rents .....	263	5	6
Dividends (exclusive of Trust Funds) .....	1518	1	8
E. H. Stirling, Donation .....	100	0	0
Sale of Transactions, Proceedings &c. ....	406	19	7
Sale of Miscellaneous Library Books .....	370	10	0
Sale of Fittings and Waste, and overpayment .....	84	9	5
<hr/>			
Income available for the Year ending Nov. 30, 1873 .....	4155	6	2
Expenditure in the Year ending Nov. 30, 1873 .....	3981	10	4
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Excess of Income over Expenditure in the Year ending Nov. 30, 1873 .....	£173	15	10

Salaries, Wages, and Pension .....	£	s.	d.
The Scientific Catalogue .....	1055	19	0
Books for the Library .....	227	10	6
Binding ditto.....	96	12	1
Printing Transactions, Part II, 1872 .....	12	1	1
Ditto Proceedings, Nos. 138-146 .....	239	4	6
Ditto Miscellaneous .....	378	13	1
Paper for Transactions and Proceedings .....	95	6	2
Binding and Stitching ditto .....	255	16	0
Engraving and Lithography .....	64	15	0
Soirée Expenses .....	440	15	11
Removal Charges and Fittings (part payment) .....	812	5	3
Miscellaneous Expenses .....	25	4	0
Coal, Lighting, Soap, &c. ....	107	0	8
Tea Expenses .....	17	15	6
Fire Insurance .....	20	1	6
Taxes .....	12	2	2
Advertising .....	13	10	0
Library Charges .....	13	0	0
Postage, Parcels, and Petty Charges.....	41	15	11
Mablethorpe Schools, Donation .....	2	2	0
	£3981	10	4

W. SPOTISWOODE,  
Treasurer.

W. SPOTTISWOODE,  
*Treasurer.*

*Trust Funds.* 1873.

*Scientific Relief Fund.*

Investments up to July 1872, New 3 per Cent. Annuities	6328 11 2
" " Metropolitan 2½ Consols	100 0 0
	<hr/>
	£6428 11 2

<i>Dr.</i>	<i>£</i>	<i>s.</i>	<i>d.</i>	<i>Cr.</i>
To Balance .....	142	9	8	
Dividends .....	190	11	9	
Donation .....	10	0	0	
	<u>£343</u>	<u>1</u>	<u>5</u>	
				By Grant .....
				Balance .....
				<u>£</u>
				<u>100</u>
				<u>243</u>
				<u>1</u>
				<u>5</u>
				<u>£343</u>
				<u>1</u>
				<u>5</u>
				<u>£6428</u>
				<u>11</u>
				<u>2</u>

*Donation Fund.*

£5331	10s. 8d.	} Consols.
211	12s. 9d.	

To Balance .....	£	s.	d.
Dividends .....	566	17	10
	163	17	4
	<hr/>		
	£730	15	2
	<hr/>		
By Grant .....	£	s.	d.
Balance .....	50	0	0
	680	15	2
	<hr/>		
	£730	15	2
	<hr/>		



*Rumford Fund.*

£2322 19s. Consols.

£	s.	d.	£	s.	d.		
1872. Two years' Dividends .....	136	8	0	By Gold and Silver Medals.....	60	14	9
1873. Dividends .....	68	13	5	A. J. Ångström.....	75	13	3
					£136	8	0
				Medal Cases .....	1	10	0

By Gold and Silver Medals.....  
A. J. Ångström.....

Medal Cases .....

*Bakerian and Copley Medal Fund.*

£403 9s. 8d. New 2½ per Cent.

£	s.	d.	£	s.	d.	
To Balance.....	67	12	11	4	14	5
Dividends .....	11	5	10	4	0	0
				2	0	6
				68	3	10
				£78	18	9

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By Gold Medal.....	4	14	5
Bakerian Lecture.....	4	0	0
Medal Cases and Expenses of Transfer .....	2	0	6
Balance .....	68	3	10
	£78	18	9

By Gold Medal.....  
Bakerian Lecture.....  
Medal Cases and Expenses of Transfer.....  
Balance .....

*Wintringham Fund.*

£1200 Consols.

	£	s.	d.		£	s.	d.
To Balance .....	35	5	0	By Payment to Foundling Hospital .....	35	5	0
Dividends .....	35	9	6	Balance .....	35	9	6
					<u>£70</u>	<u>14</u>	<u>6</u>

By Payment to Foundling Hospital .....

Balance .....

*Croonian Lecture Fund.*

	£	s.	d.
To one fifth of Rent of Estate at Lambeth Hill, payable by the College of Physicians .....	2	19	0
By Croonian Lecture .....	2	19	0

*Davy Medal Fund.*

£660 Madras Guaranteed 5 per Cent. Railway Stock.

	£	s.	d.
To Balance .....	104	0	9
Dividends .....	32	10	4
	£136	11	1

*The Gassiot Trust.*

£10,000 Italian Irrigation Bonds.

	£	s.	d.
To Balance .....	109	3	7
Dividends .....	498	17	0
	£608	0	7
By Payments to Kew Committee .....	608	0	7

*Fairchild Lecture Fund.*

	£	s.	d.
To New 2½ per Cent. Stock .....	110	0	0
Dividends .....	2	18	9
	£112	18	9
By Stock transferred to Charity Commissioners .....	110	0	0
Rev. T. S. Evans, for Fairchild Lecture .....	2	18	9
	£112	18	9

Account of the appropriation of the sum of £1000 annually voted by Parliament to the Royal Society (the Government Grant), to be employed in aiding the advancement of Science (continued from Vol. XXI. p. 35).

1873.

1. Dr. Stenhouse, for continuation of Researches on the Orcins and Varieties of Tannins .....	£100
2. W. Galloway, for Experiments bearing on the Causes of Colliery Explosions .....	75
3. W. N. Hartley, for Researches on the effect of Heat on Absorption Spectra .....	50
4. Dr. Klein, for Researches on the Lymphatic System of the Higher Animals .....	100
5. J. Dewar and W. Dittmar, for Experiments on Vapour Densities at High Temperatures .....	50
6. A. Dupré, for investigating the Specific Heat of Mixtures and of Elements in the Nascent State .....	50
7. W. Lassell (as Treasurer of the Eclipse (1870) Committee), for a Spectroscope for the Eclipse Expedition .....	£17 10s.
8. Rev. Canon Selwyn, for continuation of his Series of Solar Autographs .....	50
9. Dr. Frankland, Researches on Organo-Boron Compounds, and on the Synthesis of Organic Acids .....	100
10. J. N. Lockyer, for procuring a Siderostat, to be employed in photographing in detail the Spectroscopic Phenomena observed in the Solar Disk .....	300
11. Rogers Field, for continuation of Experiments to determine the Amount of Evaporation from a Water-surface .....	100
12. Prof. B. Stewart, for investigating a possible connexion between the Meteorology of our Earth and the Positions of the nearer Planetary Bodies .....	100
13. F. Galton, for the construction of an Instrument for computing the mean Distance which a ship could sail in one day, &c...	25
14. W. C. Williamson, for continuation of Researches into the Organization of the Fossil Plants of the Coal-measures .....	25
15. Prof. P. G. Tait, for a research on the Thermoelectric Properties of Metals and Alloys .....	75
Cheque Book .....	0 10s.
	<hr/> £1218

<i>Dr.</i>	£	s.	d.			£	s.	d.	<i>Cr.</i>
To balance on hand,					By appropriations as				
Nov. 23, 1872....	1140	0	1		above .....	1218	0	0	
To Grant from Treasury (1873).....	1000	0	0		Balance on hand, Nov.				
					23, 1873 .....	1047	18	9	
Repayments :—									
Capt. M. Hall.....	50	0	0						
Sale of surplus copies									
of “Hydrozoa” ..	40	10	0						
Interest .....	35	8	8						
	<u>£2265</u>	<u>18</u>	<u>9</u>			<u>£2265</u>	<u>18</u>	<u>9</u>	

*Report of the Kew Committee for the Year ending  
October 31, 1873.*

THE only change of consequence affecting the management of the Observatory during the year has been caused by the resignation by Mr. Spottiswoode of his seat on the Committee. The vacancy thus occasioned has been filled up by the appointment of Major-Gen. Strachey, while the Earl of Rosse has been nominated as an additional member of the Committee.

*Magnetic Work.*—The series of automatic records of the several Magnetographs, viz. Declinometer, Horizontal-Force, and Vertical-Force instruments, have been continued, and the independent absolute determinations have been, as usual, made monthly. This latter duty has been, as heretofore, performed by Mr. G. M. Whipple, B.Sc., First Assistant, who also takes charge of the General Magnetic Work, in which he has the assistance of Mr. Cullun. The salaries of these two gentlemen, whose time is chiefly devoted to magnetic work, amounted during the period under consideration to £249 12s. 6d., leaving a balance of about £350 out of the sum of £608 0s. 7d. received from the Royal Society to meet the general expenses (£1979 10s. 7d.) of the Observatory. £673 4s. 5d. of this amount has been defrayed by the Meteorological Office; and £613 0s. 1d. has been obtained from other sources, such as fees for verification of instruments, and payments for new instruments for foreign observatories, leaving a balance in hand of £522 3s. 1d. on the 31st of October.